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ON *HOPLOCRABRO*, A SUBGENUS OF *CROSSOCERUS* (HYMENOPTERA: SPHECIDAE: PEMPHILIDINI)

BY V. S. L. PATE,

Cornell University, Ithaca, New York

Thomson, in his review of the Scandinavian Hymenoptera[1], recognized four genera of Pemphilidine wasps[2]: *Rhopalum, Entomognathus, Lindenius* and *Crabro,* the last of which he divided into a dozen subgenera.[3] Two of these, *Coelocrabro* and *Hoplocrabro,* were propounded there as new. The former, although still recognized as a discrete entity by many authors, is, as a result of subsequent nomenclatorial vicissitudes, congeneric with *Blepharipus* Lepeletier & Brullé, 1835[4]; but the latter, *Hoplocrabro,* has ever since Thomson established it been regarded as a valid and distinct generic or subgeneric complex, As here understood, *Hoplocrabro* is a subgenus of *Crossocerus.*

Four Nearctic forms have been described that are referable to Thomson's subgenus. But, as indicated on the following pages, only one species of *Hoplocrabro* is present in North America: *vierecki* Smith, *boulderensis* Rohwer, and *spinibuccus* Viereck are all synonyms of Kincaid's much earlier name *angelicus.*

To Professor Trevor Kincaid of the University of Washington, I am greatly indebted for kindly supplying me with information about his species *Crabro angelicus.* I also wish to express my thanks to Professor E. H. Strickland of the University of Alberta, and Dr. H. A. Scullen of the Oregon Agricultural College at Corvallis for sending me much of the material upon which the present study is based.

Subgenus **Hoplocrabro** Thomson

Crabro (*Hoplocrabro*) Thomson, Hymen. Scand., III, p. 277, (1874).—Dalla Torre, Cat. Hymen. VIII, pp. 579, 621-622, (1897).—Schmiedeknecht, Hymen. Mitteleurop., p. 192, (1907).—Berland, Faune de France, X, p. 186, (1925).—Schmiedeknecht, Hymen. Nord- u. Mitteleurop., Zw. Aufl., p. 648, (1930).—Grandi, Mem. R. Accad. Sci., 1st. Bologna, Cl. Sci. Fis.: Sez. Sci. Nat., (8), VII, p. 76, (1930); (biology).—E. T. Nielsen, Entom. Meddel., XVIII, p. 270, (1933); (biology).

Crabro (Haupt- Artengruppe *Crabro;* Artengruppe *Hoplocrabro)* Kohl, Ann. K. K. Naturhist Hofmus. Wien, XI, p. 492, (1896).

Crabro (Artengruppe *Crossocerus*: Untergruppe *Hoplocrabro)* Kohl, Ann. K. K. Naturhist. Hofmus. Wien, XXIX, pp. 195, 219, 398, (1915).—Pate, Mem. Amer. Ent. Soc., no. 9, p. 32, (1937).

Hoplocrabro Ashmead, Canad. Entom., XXXI, p. 216, (1899).—Richards, Gen. Names Brit. Ins., pt. 5, pp. 106, 133, (1937).

GENOTYPE: *Crabro 4maculatus* Fabricius, 1793 [=*Crossocerus (Hoplocrabro) 4-maculatus* (F.)]. (Monobasic.)

The present subgenus forms a small but compact entity differentiated from the other subgenera of *Crossocerus* by the more or less strongly toothed gular region of the head and the structure of the mandibles which are simple at apex in the females but bifid in the males. In addition, the mandibles are edentate on their inner margins in both sexes; the mesopleura are simple and unarmed before the middle coxae; the first abdominal segment is short, no

[1]Thomson, C. G.: Skandinaviens Hymenoptera. Lund, 1874. 5 vols.

[2]*Op. cit.,* III. pp. 256-257.

[3]*Op. cit.,* III. pp. 262-264.

[4]*Cf.*: Pate, 1937, Mem. Amer. Ent. Soc., no. 9: *Blepharipus,* p. 14, footnote 33; *Coelocrabro,* p. 19, footnote 50.

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longer than broad at apex, and perfectly sessile with the second segment; the females have a flat, opaque, trigonal pygidium, while in the males the apical abdominal tergites and sternites are simple and unmodified. Furthermore, in the fore wings the second abscissa of cubitus is distinctly shorter than the first, while the anal lobe of the hind wing is fully as long as the submedian cell. No other complex of *Crossocerus* possesses this combination of distinctive features.

Diagnostic Features. Finely punctate, more or less fulgid, moderately small forms. Head subquadrate in anterior aspect, transversely subrectangular in dorsal aspect. Eyes naked, more coarsely facetted anteriorly than posteriorly; inner orbits strongly convergent toward clypeus and antennal sockets; malar space wanting. Front on anterior vertical aspect narrow and somewhat concave between inner orbits, simple, unarmed, and without a marginate scapal sinus; upper horizontal portion on same plane as vertex and bisected by a strong impression running forward from anterior ocellus. Vertex with supra-orbital foveae present but usually rather poorly defined; ocelli situated in a subequilateral triangle, the postocellar line shorter than the ocellocular distance; temples moderate; occipital carina sharp, distinct, but neither a complete circle in extent nor attaining the hypostomal carinule, terminating below in a sharp spine which is usually larger and more distinct in females than in males. Antennae distinctly thirteen-segmented in males and twelve-segmented in females, situated low on face on dorsal margin of clypeus, the sockets contiguous to each other and to nearest lower inner orbit; scapes straight, cylindrical, ecarinate; flagellum relatively simple in both sexes, in males with a fringe of hair beneath. Clypeus short, transverse, the disc flatly tectate, usually with a quadridentate median lobe. Maxillary palpi with six, labial palpi with four segments. Mandibles with apices simple in females, bifid in males; both sexes with lower margins entire and inner margins edentate. Females without a psammophore.

Thorax with pronotum short, transverse, its anterior dorsal margin ecarinate. Mesonotum relatively simple; axillae small, immarginate; scutellum and postscutellum simple. Mesopleura with a sharp epicnemium anteriorly; episternal suture and mesopleural pit distinct; episternauli, mesopleurauli, hypersternauli and sternauli all absent; simple, without either a vertical carina or tubercle before middle coxae; mesosternum rounded anteriorly, not transversely carinate. Propodeum without coarse sculpture; dorsal face with a sharply delimited subtrigonal or semicircular enclosure; lateral carinae more or less distinct.

Legs simple; both sexes with fore tarsi simple, neither flattened nor with a pecten. Middle tibiae of both sexes with a distinct apical calcar.

Fore wings with marginal cell elongate, appendiculate; transverse cubital vein sinuate, received on radial vein about its basal third; recurrent vein joining cubitus a little beyond the middle but second abscissa of cubitus always distinctly longer than transverse cubital vein. Hind wing with anal lobe large, distinct, as long as the submedian cell.

Abdomen elongate-fusiform; with or without maculations; first segment no longer than wide at apex and perfectly sessile with second segment. Tergites with basal acarid chambers, and folded under roundly and imbricate with the convex sternites. Males without a pygidial area on ultimate tergite, the puncturation of which is somewhat more distinct and coarser than that of preceding tergite; neither tergite with inflexed ventral processes. Apical sternites simple, without processes; hypopygium simple, flat. Females with a flat, trigonal pygidial area on last tergite.

Component Species. The subgenus *Hoplocrabro,* as here understood, comprises but two species: 4-*maculatus* Fabricius, 1793 and *angelicus* Kincaid, 1900.

Two North American species: *Crabro ferrugineipes* Rohwer[5] and *Crabro novanus* Rohwer[6], assigned by their author to *Hoplocrabro,* are referable to *Hypocrabro,* a subgenus of *Ectemnius.* The former, as Rohwer later discovered, is merely a colour variant of *Ectemnius imbutus* (Fox), 1894.

Ethology. The biology of the Palaearctic form 4-*maculatus* (F.) is rather well known as a result of the published notes of Ferton[7], Maneval[8], Adlerz[9], Hamm and Richards[10], Verhoeff[11], Goureau[12], and Dahlbom[13]. The ethology of the North American species *angelicus,* of which nothing is recorded, is probably quite similar or parallel to that of its European congener.

The Old World species 4-*maculatus* is a fossorial form which constructs its burrows in vertical banks of hard sand. The nest consists of an oblique and often tortuous passage that penetrates the ground to a depth of about 30 cm.; this initial gallery then branches, dividing and subdividing quite irregularly until each branch finally terminates in a small oval cell.

As may be seen by consulting the following list, 4-*maculatus* is polyphagous and quite catholic in its choice of prey. Anthomyid flies and other Cyclorhaphous Diptera are the prey usually chosen and stored during the drier portions of the years or in more xeric localities. But as Maneval has indicated, these Cyclorhapha decline in relative numbers in the more humid periods of the year such as September, or for that matter in damper regions; 4-*maculatus* then has recourse to Nematocera and Brachycera, and occasionally caddis flies or even microlepidoptera, all of which are then comparatively abundant.

RECORDED PREY OF *CROSSOCERUS (HOPLOCRABRO) 4-MACULATUS*

DIPTERA

Trichoceridae: *Trichocera hiemalis* (DeG.); *T. annulata* (Mg.); *T. regelationis* (L.); [Maneval, 1939].

Tipulidae: *Limnobia tripunctata* (F.); [Maneval, 1928]. *Limnobia*

[5]*Crabro (Solenius?) ferrugineipes* Rohwer, Ent. News, XIX, p. 250, (1908); [♂; Pecos, New Mexico].—*Crabro (Hoplocrabro) ferrugineipes* Rohwer, Proc. U. S. Nat. Mus., XL, p. 564, (1911); [♂, ♀; Meadow Valley, Mexico].—*Solenius (Hypocrabro) imbutus* Rohwer, Proc. U. S. Nat. Mus., LIII, p. 242, (1917).

[6]*Crabro (Hoplocrabro) novanus* Rohwer, Proc. U. S. Nat. Mus., XL, p. 564, (1911); [♀; Meadow Valley, Mexico]

[7]FERTON, Ch. Notes détachées sur l'instinct des Hyménoptères mellifères et ravisseurs, (1e Serie). Ann. Soc. Ent. France, LXX, pp. 83-148, (1901). [*Crabro* 4-*maculatus* F., pp. 113-114; nidification and prey records.]

—Notes détachées sur l'instinct des Hyménoptères mellifères et ravisseurs, (2e Series). Ann. Soc. Ent. France, LXXI, pp. 499-531, (1902). [*Crabro* 4-*maculatus* F., p. 518,; additional prey records.]

—Notes détachées sur l'instinct des Hyménoptères mellifères et ravisseurs, (3e Serie). Ann. Soc. Ent. France, LXXIV, pp. 56-104, (1905). [*Crabro* 4-*maculatus* F., pp. 71-73; description and figures of larva, pupa and cocoon.]

[8]MANEVAL, H. Notes sur quelques Hyménoptères fouisseurs. Bull. Soc. Ent. France, pp. 29-32, (1928). [*Hoplocrabro* 4-*maculatus* F., pp. 29-30; nidification and prey records.]

—Notes sur les Hyménoptères. Ann. Soc. Ent. France, CVIII, pp. 49-108, (1939). [*Hoplocrabro* 4-*maculatus* F., pp. 84-86; prey records and discussion of biology; description and figures of mature larva and cocoon.]

[9]ADLERZ, G. Lefnadsförhallenden och Instinkter inom Familjerna Pompilidae och Sphegidae. K. Svenska Vetensk. Akad. Handl., XLV:12, pp. 6-75, (1910). [*Hoplocrabro* 4-*maculatus* F., p. 53; nidification, prey, etc.]

[10]HAMM, A. L. & O. W. RICHARDS. The Biology of the British Crabronidae. . Trans. Ent. Soc. London, pp. 297-331, (1926. [*Hoplocrabro* 4-*maculatus* F., pp. 317, 327-328; nidification and prey.]

[11]VERHOEFF, C. Biologische Aphorismen uber einige Hymenopteren, Dipteren und Coleopteren. Verh. naturh. Ver. preuss. Rheinl., XLVIII, pp. 1-80, (1891). [*Crabo* 4-*maculatus* F., p. 29; nidification and prey.]

[12]GOUREAU, M. Observations détachées pour servir a l'histoire de quelques insectes. Ann. Soc. Ent. France, VIII, pp. 531-556, (1839). [nidification and prey of an unnamed species of *Crabro* considered by subsequent authors to be 4-*maculatus* F., pp. 543-545.]

[13]DAHLBOM, A. G. Hymenoptera Europaea. (1845). [*Crabro (Blepharipus)* 4-*maculatus* F.; vol. I, p. 352; prey.]

nubeculosa (Mg.); *Dicranota* sp.; [Maneval, 1939].

Anisopodidae: *Anisopus punctatus* (F.); [Adlerz, 1910; Hamm & Richards, 1926; Maneval, 1939].

Culicidae: *Culex pipiens* (L.); [Verhoeff, 1891; Ferton, 1901; Maneval, 1939]. *Anopheles bifurcatus* (L.); [Adlerz, 1910].

Chironomidae: *Tanypus nebulosus* (Mg.); [Hamm & Richards, 1926].

Mycetophilidae: *Mycetophila* sp.; [Maneval, 1929].

Rhagionidae: *Atherix ibis* (F.); [Goureau, 1839]. *Rhagio lineola* (F.); [Hamm & Richards, 1926].

Dolichopodidae: *Dolichopus plumipes* (Scop.); [Maneval, 1928]. *Sciopus* sp.; [Ferton, 1902].

Empididae: *Hilara litorea* (Fall.); *H. flavipes* (Mg.); *Empis volucris* var. *vitripennis* (Mg.); [Hamm & Richards, 1926].

Helomyzidae: *Suillia variegata* (Loew); [Maneval, 1928]. *Thelida commixta* (Coll.); [Hamm & Richards, 1926].

Sapromyzidae: *Sapromyza pallidiventris* (Fall.); [Hamm & Richards, 1926]. *S. fasciata* (Fall.); [Ferton, 1901]. *Lauxania aenea* (Fall.); [Maneval, 1928].

Pallopteridae: *Palloptera umbellatarum* (Mg.); [Maneval, 1928].

Anthomyiidae: *Hylemyia brunneilinea* (Zett.); *H. variata* (Fall.); *H. coarctata* (Fall.); *H. lasciva* (Zett.); *H. strigosa* (F.); *H. albula* (Fall.); [Maneval, 1928]. *Fannia canicularis* (L.); *F. incisurata* (Zett.); *Helina quadrum* (F.); [Ferton, 1901]. *Fannia scalaris* (F.) [Dahlbom, 1845; Ferton, 1901]. *Hammomyia grisea* (Fall.); [Hamm & Richards, 1926].

TRICHOPTERA

Phryganeidae: *Nannophryganea minor* (Curt.); [Hamm & Richards, 1926].

Hydropsychidae: *Hydropsyche instabilis* (Curt.); [Maneval, 1939].

LEPIDOPTERA

Olethreutidae: *Epiblema corticana* Hb.; [Hamm & Richards, 1926].

The Cyclorhapha stored by the wasp are stung and completely paralyzed but the Nematocera and other forms captured show evident signs of life; Maneval states that the wasp merely malaxates them. The number of victims stored in each individual cell of a nest varies considerably. some contain as many as ten or twenty flies, other cells have as few as three victims. In the latter case the number of flies stored obviously will not suffice for the complete development of the larva inhabiting that particular cell, and this, coupled with the fact that the female wasp frequents the nest and carries victims to it for quite a period, led Verhoeff in 1891 to postulate the theory that 4-*maculatus* feeds its young from day to day. The notes of most subsequent investigators do not substantiate this hypothesis. However, the observations made by Maneval in 1928 indicate that such might be the case, but further data are necessary before it may be definitely asserted that 4-*maculatus* practices progressive provisioning of its nest.

The larva, pupa and cocoon of 4-*maculatus* were first described by Ferton in 1905. Recently Maneval gave an excellent and detailed description and figures of the mature larva and cocoon of this wasp.

According to Adlerz there are probably two generations of 4-*maculatus* a year in Sweden.

There are no records of any parasites of 4-*maculatus* but, like many other fossorial wasps, it is probably subject to the attacks of various Mutillid and Chrysid wasps and Miltogrammine flies.

Distribution. The subgenus *Hoplocrabro* is a small entity confined largely, if not wholly, to the Holarctic Region. In the Palaearctic Region it is represented by one species, 4-*maculatus* (F.)[14], which is rather common and widespread throughout Europe and northern Africa; this species ranges eastward well into Asia, according to Kohl, who reports it from Semipalatinsk in Turkestan and Irkutsk in Siberia. The present data indicate that but one species likewise occurs in North America. The Nearctic form, *angelicus* (Kincaid), ranges widely throughout the more xeric area of the continent, west of the twenty-inch isohyet which coincides approximately with the hundredth meridian. The ancestral stock of this latter species without doubt reached North America via the Siberian-Alaskan land bridge sometime during the Tertiary, for the complex as a whole is probably Old Word in origin..

Crossocerus (Hoplocrabro) angelicus (Kincaid)

Crabro angelicus Kincaid, Ent. News, XI, p. 358, (1900); [♀ (rect ♂); Seattle, Washington].
Crabro (Hoplocrabro) vierecki H. S. Smith, Univ. Nebraska Stud., VIII, p. 401, (Dec., 1908) [♀; Glen, Sioux Co., Nebraska].—Mickel, Univ. Nebraska Stud., XVII, p. 325, (1918); [Worland, Wyoming].—Mickel, Univ. Nebraska Stud., XVII, p. 381, (1918); [♀; Glen; Monroe Canyon; Nebraska].
Crabro (Hoplocrabro) boulderensis Rohwer, Ent. News, XX, p. 323, (July, 1909); [♂; Boulder, Colorado].
Crabro (Hoplocrabro) spinibuccus Viereck, Proc. Ent. Soc. Washington, XI, p. 44, fig. 2a. (July 26, 1909); [♀; Havilah, Kern Co., California].—Cresson, Mem. Amer. Ent. Soc. no. 5, p. 56, (1928).

The present Nearctic species is distinguished from the European form 4-*maculatus* by its immaculate black, or red and black abdomen, its more closely punctate head and thorax, and by the character of the supra-orbital foveae: in *angelicus* these are weakly impressed and cuneate or sublunate in shape, but in 4-*maculatus* they are embossed and reniform. Furthermore, the maculations of the head, thorax and legs are ivory white in *angelicus;* in 4-*maculatus* they are deep yellow in colour. In addition, the males of 4-*maculatus* have the occipital carina rather well developed, somewhat flanged and foveate, and terminating ventrally in a sharp spinoid tooth, while the hypopygium is retuse medio-apically; in *angelicus,* on the other hand, the hypopygium is entire at apex, and the occipital carina terminates below in a rather short acute tooth and is neither appreciably flanged nor foveate. Moreover, the females of 4-*maculatus* have the clypeal disc more sharply keeled, and the temporal spine much less pronounced than in the corresponding sex of *angelicus,* while the anterior dorsal margin of the pronotum is rather sharply angulate, whereas in *angelicus* it is merely rounded.

In view of the confusion concerning the identity of *angelicus,* a redescription of the species, based upon the material examined, is presented herewith.

Male. 6.5 mm. long. Black; the following eburneous: palpi, clypeus except apical margin and a narrow median longitudinal stripe, scapes anteriorly, pronotum dorsally with an elongate spot laterally on each side, pronotal tubercles, postscutellum, outer faces of fore and middle tibiae, and hind tibiae on basal third, fore and middle tarsi except last segment, and hind metatarsi narrowly annulate at base, and middle coxae on inner faces. Dark castaneous: mandibles except for red apices, scapes behind, fore and middle tibiae below, and abdominal venter more or less. Fulvous: tegulae, axillary sclerites, hind tibial calcaria. Wings clear hyaline, iridescent; stigma and veins brunneous.

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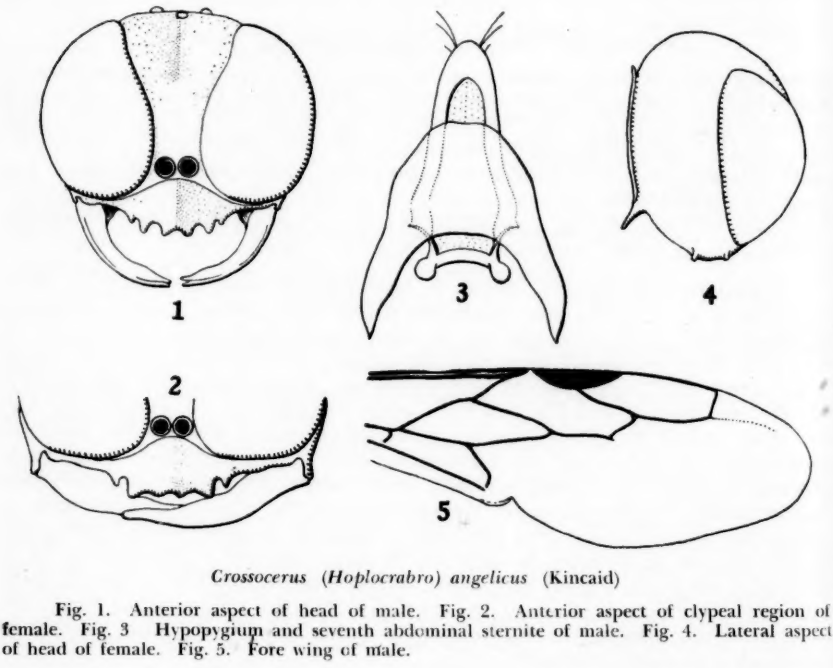
[14]*Cf.*: Kohl, Ann. K. K. Naturhist. Hofmus. Wien, XXIX, p. 219-221, (1915).

Head subfulgid; clypeus with an appressed, silvery, sericeous pile; vertex, temples, and upper portion of front more sparsely clad with short, decumbent, silvery pubescence. Eyes naked, more coarsely facetted anteriorly than posteriorly; inner orbits strongly convergent toward clypeus and antennal sockets. Malar space wanting. Front on anterior vertical aspect between inner orbits narrow and shallowly concave and with a glabrous, nitidous, immarginate scapal basin; dorsal portion on same plane as vertex, with moderately fine and close setigerous puncturation, bisected by a deep impressed furrow running forward from anterior ocellus toward scapal basin; vertex punctate like upper portion of front; ocelli moderately large, situated in an equilateral triangle, the postocellar line about seven-tenths (.72) the ocellocular distance; supra-orb-



Crossocerus (*Hoplocrabro*) *angelicus* (Kincaid)

Fig. 1. Anterior aspect of head of male. Fig. 2. Anterior aspect of clypeal region of female. Fig. 3 Hypopygium and seventh abdominal sternite of male. Fig. 4. Lateral aspect of head of female. Fig. 5. Fore wing of male.

ital foveae indicated by poorly delimited, opaque, cuneate impressions extending obliquely from posterior ocelli to upper inner orbits.. Temples simple, finely acupunctate throughout; occipital carina distinct and terminating abruptly below in a small acute tooth, but not appreciably flanged, foveate, neither a complete circle in extent nor attaining the hypostomal carinule. Antennae simple; the sockets contiguous to each other and to nearest lower inner orbit; scape cylindrical, ecarinate, almost one-half (.45) the vertical eye length; pedicel cylindrical to obterete, three-fifths the length of first flagellar article; flagellum simple, finely puberulent, all segments with a fringe of erect hairs below, first segment five-thirds the length of second which is six-fifths the length of third, ultimate article somewhat compressed, arcuate below, subtruncate apically and one and three-fourths the length of penult article. Clypeus short, transverse, one-fourth the vertical eye length; flat and attenuate laterally, flatly tectate discally with a weak median longitudinal keel, produced medio-apically into a short broad quadridentate lobe whose width is one and four-tenths the median

clypeal length, and laterad of which on each side is a dentiform angle. Mandibles elongate, rather stout; apices bifid, the lower tooth the shorter; lower margins entire; inner margins simple, edentate.

Thorax more or less fulgid; thinly clothed dorsally with a vestiture of short, suberect, silvery hair; pleura with more noticeable, appressed silvery pubescence. Pronotum finely punctate throughout, situated about on a level with the mesonotum; short, transverse; anterior dorsal margin abruptly rounded, ecarinate, but hind margin deeply and strongly impressed; lateral angles subangular. Mesonotum with rather fine and separated puncturation throughout, bisected on anterior half by a fine, raised, double longitudinal line, parallel to which on each side is another fainter line; axillae small, simple, immarginate; suture between mesonotum and scutellum deeply impressed and finely foveate; scutellum flatly tumid, punctured like mesonotum, lateral edges immarginate; postscutellum simple, punctured like scutellum. Mesopleura with fine, well separated, setigerous acupuncturation throughout; anteriorly with a sharp epicnemium; episternal suture somewhat foveate; mesopleural pit distinct; simple before middle coxae, without either a vertical carina or tubercle; posterior margin simple. Metapleura glabrous, nitidous, hind margin distinctly foveolate. Mesosternum simple, rounded, ecarinate anteriorly. Propodeum with a scant and inconspicuous vestiture of erect puberulent silvery hair on posterior face, otherwise glabrous; dorsal face with a large, glabrous, subnitidous, subtrigonal enclosure delimited by a strongly foveate groove, anterior margin foveolate, bisected by a shallow, weakly marginate groove which ends on posterior face in the discal submarginate lanceolate fovea, laterad of which the surface is finely acupunctate; lateral carinae present and well developed, simple below, obsolescent above between dorsal and lateral faces, their place taken by a foveolate groove; lateral faces glabrous, subnitidous.

Legs simple; fore tarsi neither flattened nor spinose. Middle tibiae with a few weak spines on outer face, apically with a distinct calcar. Hind tibiae moderately spinose on outer faces, and with two flat, sublanceolate calcaria, the longer almost two-thirds (.645) the length of hind metatarsi.

Fore wing with the marginal cell three and a half times as long as wide, and broadly, squarely truncate at apex; radial vein with first abscissa three-fifths the length of second; transverse cubital vein oblique, sinuate, two-thirds the length of second abscissa of cubitus which is three-fifths the length of first abscissa of cubitus. Hind wing with anal lobe large, distinct, as long as the submedian cell.

Abdomen elongate fusiform; subfulgid; clothed with a moderate vestiture of decumbent light hair; first segment perfectly sessile with second. Tergites finely punctate at most, and folded under roundly and imbricate with the convex sternites; second to penult tergite with distinct basal acarid chambers; ultimate tergite without a pygidial area, the punctures somewhat closer and more distinct than those of penult tergite; neither tergite with inflexed ventral processes. Sternites simple; the terminal ones without spines, tubercles or processes; hypopygium flat, simple, subquadrate to subrectangular, apical margin roundly truncate, at each distolateral angle with a pair of moderately long setulae.

Female. 7 mm. long. Similar to the male in all essential features of livery and structure except as follows:

Livery in general the same, but first three abdominal segments bright ferruginous. Wings slightly tinted with brown.

Head subopaque; vertex, temples, and upper portion of front with article; flagellum simple, without fringes of hair beneath, first segment one and punctures closer and somewhat finer; postocellar line about seven-tenths (.71)

the ocellocular distance; supra-orbital foveae larger and sublunate but more indistinct than in male; occipital carina stronger, terminating below in a large, strong, elongate, acuminate spine. Antennae with scapes a little more than half (.54) the vertical eye length; pedicel one-half the length of first flagellar article; flagellum simple, without fringe of hair beneath, first segment one and three-fourths the length of second, ultimate article simple, terete, one and four-fifths the length of penult segment. Clypeus about three-tenths (.315) the vertical eye length; the disc more flatly tectate than in male; median lobe quadridentate apically and with a strong dentiform angle laterally on each side, width of lobe one and three-tenths the median clypeal length. Mandibles large, strong, slender and elongate; apices simple, not bifid; lower margins entire; inner margins simple, edentate. No psammophore other than mandibular ammochaetae present.

Thorax with puncturation closer than in male. Propodeum with the dorsal enclosure perfulgid, traversed by striae radiating from anterior margin; lateral carinae much weaker, present only below.

Legs simple; fore tarsi neither flattened nor with a pecten. Middle and hind tibiae moderately spinose on outer faces; middle tibiae with one apical calcar; hind tibiae with two elongate, acuminate calcaria, the longer about two-thirds (.682) the length of hind metatarsi.

Abdomen elongate fusiform. Last tergite with a flat, subequilaterally trigonal pygidium whose disc is subopaque, the surface with microscopically fine cancellate sculpture upon which is superposed a series of scattered, moderately coarse punctures, each of which bears a short decumbent setula; lateral margins of pygidium glabrous.

Synonymical Notes. In an annotated list of the species of *Crabro* found in the state of Washington[15], published in February, 1900, Trevor Kincaid described two new species: *Crabro foxii* and *C. angelicus.* The latter, since originally proposed, has remained unrecognized. Kincaid, in the introduction of his paper, stated specimens of all the forms were sent to Mr. W. J. Fox of Philadelphia, and in the collection of the Academy of Natural Sciences I recently discovered a specimen bearing the label "*Crobro angelicus* Kincaid": this agrees in every respect with Kincaid's original description, and in all likelihood is a cotype. But the specimen is a male rather than a female as originally stated. However, Professor Kincaid has kindly confirmed my suspicion that his statement the species was based upon "2 ♀ ♀" was a slip of the pen or typographical error[16], and that the specimen in the Philadelphia Academy is probably one of the original pair from which *angelicus* was described.

The female sex of this highly dimorphic species was first described in December, 1908 by Harry Scott Smith under the name *Crabro* (*Hoplocrabro*) *vierecki.* I have not seen the type of *vierecki,* which is in the collection of the University of Nebraska, but material of what I consider to be the female sex of *angelicus* agrees in all respects with Smith's excellent description, and I have no doubt whatsoever that *vierecki* Smith is merely the opposite sex of Kincaid's *angelicus* and consequently must be recorded as a synonym of the latter.

For a unique male specimen found dead upon a window sill at Boulder, Colorado, Rohwer proposed the name *Crabro* (*Hoplocrabro*) *boulderensis* in

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[15]Kincaid, T. Notes on the Species of Crabro Found in the State of Washington. Ent. News, X, pp. 353-359, (Feb. 1900).

[16]In answer to an inquiry about *Crabro angelicus,* Professor Kincaid states (*in litt.*)" . .. You are correct in your interpretation of the facts, and there is no question the species was based upon a male specimen. Just how the error occurred involving the transposition of the sex signs I cannot say at this late date. I am glad however to know you have run down the discrepancy, and will have an opportunity to make the necessary correction."

the July, 1909 issue of the *Entomological News*. This is likewise, I believe, a synonym of *angelicus*..

On July 26, 1909, in the same month that Rohwer's *Crabro* (*Hoplocrabro*) *boulderensis* was published, appeared Viereck's description of *Crabro* (*Hoplocrabro*) *spinibuccus*, based upon a unique female from Havilah, California. Except for its marked erythric qualities, this specimen is a typical female of *angelicus*: Viereck's name *spinibuccus* therefore meets the same fate as Rohwer's *boulderensis* and Smith's *vierecki*.

Variation. Minor variations in the intensity of the propodeal sculpture, particularly of the dorsal enclosure, occur in some specimens, while the abdomen of some females, especially those from Havilah, California (type of *spinibuccus* Viereck) and Seattle, Washington, are almost wholly ferruginous. Otherwise the material examined agrees in all essential respects with the foregoing descriptions of the male and female sex of *angelicus*.

Specimens examined: 19; 11 males, 8 females, as follows.

ALBERTA: Edmonton; August 5, 1930; (O. Peck); 1 ♀. Wetaskiwin; July 11, 1936; (F. O. Morrison); 3 ♂, 1 ♀. Medicine Hat; August 8, 1938; (E. H. Strickland); 1 ♀; July 2, 1940; (J. L. Carr); 1 ♀. [All Univ. Alberta.]

BRITISH COLUMBIA: Revelstoke, Selkirk Mts.; elevation, 1503 feet; July, 1905; (J. C. Bradley); 1 ♂; [Cornell].

WASHINGTON: Seattle; July 16, 1898; (Trevor Kincaid; at flowers of *Angelica genuflexa*); 1 ♂; [A. N. S. P.]; July 30, 1895; (T. Kincaid); 1 ♀; [Cornell].

OREGON: Corvallis, Benton County; elevation, 227 feet; September 21; (Buchanan); 1 ♀; July 7, 1929; (H. A. Scullen); 5 ♂. Roseburg, Douglas County; elevation, 463 feet; July 28, 1925; (G. R. McGinnis); 1 ♂. Lake of the Woods, Klamath County; elevation, 4950 feet; August 12, 1935; (H. A. Scullen); 1 ♀. [All Ore. Agr. Coll.]

CALIFORNIA: Havilah, Kern County; 1 ♀; [type of *Crabro* (*Hoplocrabro*) *spinibuccus* Viereck; A. N. S. P.].

COLORADO:[17] Boulder; elevation about 5400 feet; March 6, 1909; (S. A. Rohwer; found dead on a window sill); 1 ♂; [type of *Crabro* (*Hoplocrabro*) *boulderensis* Rohwer; U. S. N. M.].

NEBRASKA:[17] Glen, Sioux County; elevation, 4000 feet; August 13, 1906; (H. S. Smith); 1 ♀; [type of *Crabro vierecki* Smith; Univ. Nebraska]. Monroe Canyon, Sioux County; August 20, 1908; (R. W. Dawson); 1 ♀; [Univ. Nebraska].

WYOMING:[17] Worland, Washakie County; elevation, 4061 feet; July 5, 1917; (L. Bruner); 1 ♀; [Univ. Nebraska].

Distribution. Like its Palaearctic congener, *angelicus* is a vagile and eurythermal form inhabiting the Canadian, Transition and Sonoran Zones of the western Canadian provinces and the United States. Its range extends from central Alberta (Edmonton) and the Selkirk Mountains of British Columbia (Revelstoke) southward through the Coast and Cascade Ranges of Washington and Oregon as far as the southern end of the Central Californian Trough (Kern County), and also through the various systems of the Rockies and the Wyoming Basin into the High Plains of western Nebraska (Sioux County) and Central Colorado (Boulder County). Eventually *angelicus* will doubtless be found widespread throughout the montane and intermontane areas of western North America.

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[17]This material has not been examined by the writer but has been recorded from the literature for the sake of completeness.

A REVIEW OF THE GENUS *ANELPISTUS* HORN (COLEOPTERA, MELANDRYIDAE)

BY EDITH W. MANK,
Lawrence, Massachusetts

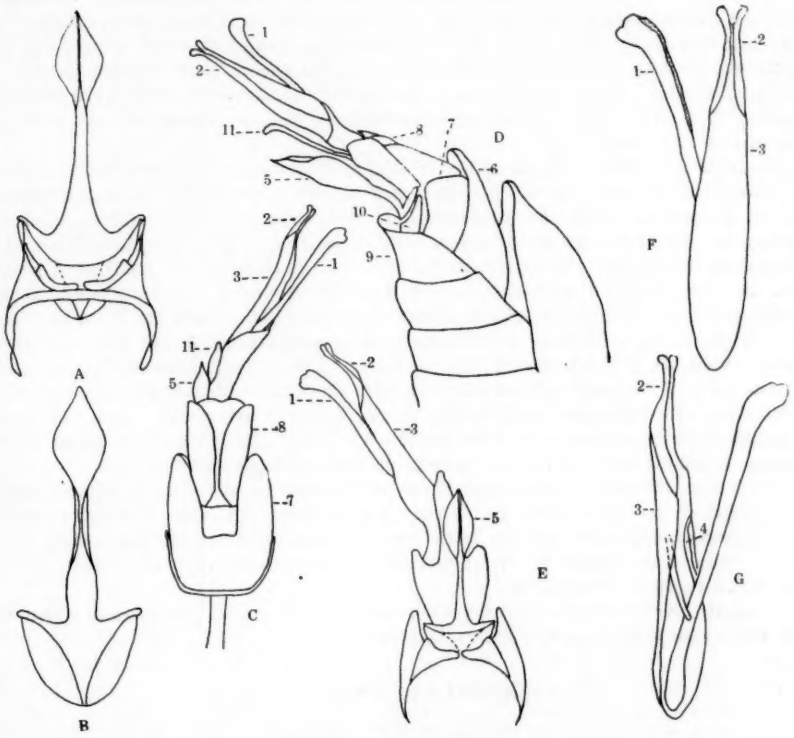
The material used in the preparation of this article included four specimens of the European *Scotodes annulatus* Esch., two in the Leconte collection and two in my own; three specimens of *Anelpistus americanus* Horn from the collection of Mr. C. A. Frost, three from the Leconte collection, four from the H. C. Fall collection, fifteen from the general collection at the Museum of Comparative Zoology, and one from my own collection. All the American specimens bore the label Mt. Washington or White Mountains or simply N. H. Besides these specimens, there were three, herein described as a new species, *Anelpistus canadensis,* which were collected by Mr. H. B. Leech at Fernie, B. C. (one marked 4500 ft. and another 5000 ft.) These came into my hands through the kindness of Mr. Leech who called my attention to the fact that Dr. K. G. Blair of the British Museum believed that the so called American *Scotodes* did not belong to that European genus. He also suggested that the specimens from British Columbia might represent a new species. With these facts at hand, comparisons were made with the results that are indicated in the following review. I am indebted to Mr. H. B. Leech, Dr. P. J. Darlington, Jr., and Dr. R. E. Snodgrass for valuable assistance in the preparation of this article.

The genus *Scotodes* is listed in the Leng list as containing one American beetle, described by Horn in 1870 from Mt. Washington, N. H., under the name *Anelpistus americanus.* The next year, upon examination of two specimens of the European *Scotodes annulatus,* Horn suppressed the generic name *Anelpistus,* assigning his species to the genus *Scotodes.* It does not seem necessary to thus suppress the genus *Anelpistus* for there are other important differences, besides those mentioned by Horn, which distinguish the American species generically from the European *Scotodes.*

In general form, *Scotodes* and *Anelpistus* are alike. Both are elongate, with the head bent downward, being only partially visible from above. Also in general markings they are similar, both having a dark background with similar light pubescence arranged in *americanus,* for example, in two transverse bands, one near the middle of the elytra and the other on the apical part, while in *Scotodes annulatus* the bands are three in number. As indicated in the original description, the form of the thorax is at once seen to be manifestly different. In *Scotodes,* as represented by *annulaltus,* the length of the thorax is greater than the width; the lateral margin is interrupted at the middle; the sides are sinuate anterior to the hind angles, making the posterior angles prominent; the hind margin is trisinuate, with well defined depressions near the middle of the base of each elytron; the thorax at the base is decidedly narrower than the elytra. The thorax of *Anelpistus,* on the other hand, is wider than long; the lateral margin is not interrupted at the middle; the sides of the thorax are gradually narrowed from before the middle to the hind angle without making the posterior angle prominent; the posterior margin of the thorax has distinct impressions near the middle of the base of each elytron, but these are not as well defined as in *Scotodes;* the posterior margin is not trisinuate; the thorax at the base is slightly narrower than the elytra. The sculpture of the elytra in *Scotodes* is practically the same throughout the whole length, while in *Anelpistus* the punctures are finer and more widely spaced apically than toward the base where they become scabrous.

Besides these thoracic and elytral differences, the genera differ in the form of the epipleura, in the position of the middle coxae, in the tibiae of the male, in the tibial spurs, in the margin of the last abdominal segment, and in the

male genitalia. In both genera the epipleura are small, but in *Scotodes* they are greatly widened at the base, running up toward the humeri, while in *Anelpistus* the widening is slight, and the humeri are therefore rounded as viewed from the side. On the underside in *Scotodes*, the middle coxae are separated



Scotodes annulatus Esch.

A. Ventral view of 8th sternite with plate and spine attached.
B. Dorsal view of plate and spine.
C. Dorsal view showing 8th and 9th tergites.
D. Terminal segments with aedeagus and parameres in place.
E. Ventral view with spine in place.
F. Ventral view of genital tube.
G. Dorso-lateral view of genital tube.
1. Aedeagus. 2. Parameres. 3. Phallobase. 4. Strut. 5. Spine attached to 8th sternite. 6. 7th tergite. 7. 8th tergite. 8. 9th tergite. 9. 7th sternite. 10. 8th sternite. 11. 9th sternite.

completely by the projection of the mesosternum, while in *Anelpistus* they are contiguous posteriorly. The fifth apparent sternite (this is the seventh according to morphology) in the males of *Scotodes* is rounded, without any notch, while in *Anelpistus* this fifth segment is notched. The tibiae of the males are straight in *Scotodes*, while they are decidedly arcuate in *Anelpistus*. The inner edge of the tibia of *Anelpistus* is sharp and armed more than half its length with a row of sharp black teeth. The line, thus formed, bends apically toward the inner tibial spur. In *Scotodes* this type of edge is lacking.

In the original description (1870), where the author compared the new

species of *Anelpistus* with *Scotodes,* known to him only by description and through a figure by Duval, he states that *Anelpistus* "possesses all the other characteristics of *Scotodes* even to the form of the tibial spurs and can be distinguished only by the form of the thorax." When a year later he examined specimens of *Scotodes,* no comments were made on the spur which upon examination proves to be interesting. In all four specimens of *Scotodes* examined, the two tibial spurs on the hind leg are fairly stout and scooped out along one side like a sugar scoop, while in *Anelpistus* this form occurred in none of the specimens. In most cases, the two spurs in *Anelpistus* were slender at the tip and with a single sharp point. In a few specimens, however, they were flattened slightly and bifid, this condition occurring in one specimen on one hind leg but not on the other.

The genitalia of both *Scotodes* and *Anelpistus* have a phallobase with a ventrally placed sclerite and with the dorsal aspect membranous. The articulation of the parameres with the phallobase is well removed from the base of the aedeagus. In both, the aedeagus is nearly as long as the phallobase and parameres combined. However, in *Scotodes* the parameres are narrowed, placed side by side, heavily sclerotized, and apparently more firmly joined to the phallobase. In *Anelpistus,* on the other hand, the parameres are broader, often crossed at the tips, clothed with hairs, and in general more like those of allied species such as *Stenotrachelus aeneus* Fab. The eighth sternite in the male *Scotodes* has a very strongly developed, keel-shaped spine and plate attached to it whereas the corresponding spine in *Anelpistus* is short and apparent only on close examination. This plate and spine which occur in some of the genera of the melandryids is an interesting and unusual structure.

Since, therefore, there are these differences in the form of the thorax, the sculpture of the elytra, the form of the epipleura, the contiguity of the middle coxae, the apex of the fifth sternite, the form of the male tibiae, the tibial spurs, and finally in the genitalia, it seems advisable to restore to our lists Horn's genus *Anelpistus.*

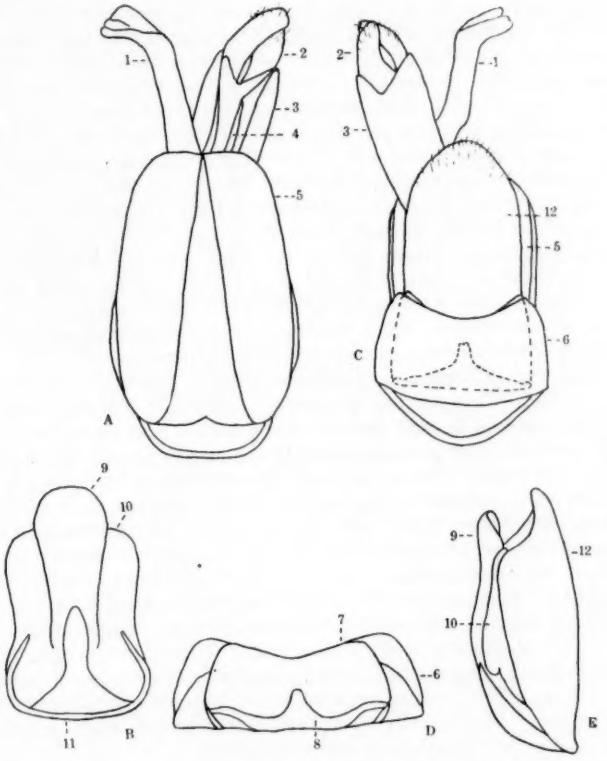
The following descriptions will, perhaps, be sufficient to distinguish the two American species of the genus *Anelpistus.*

Anelpistus americanus Horn.

Head inserted in the thorax so that the posterior part is covered almost to the eyes; coarsely punctate, with fairly long cinereous hairs, punctures on the clypeus less coarse than on the front. These punctures on the front with less definite rings around them than on the front in *Anelpistus canadensis* n. sp, and not packed as closely together. Labrum transverse, finely punctured; apical edge with a smooth, light colored area. Antennae filiform, segment three elongate, about twice as long as two and more than two-thirds the length of four and five together; four and five about equally long; six and seven each about two-thirds the length of four and five respectively; eight shorter than seven; nine, ten, and eleven at the base wider compared with the apex than in the preceding segments or, in other words, more nearly parallel-sided, almost forming a club. These three terminal segments without as many long hairs as the preceding segments but clothed with a fine recumbent pubescence. Eyes on the side of the head, oblique, globose, sparsely hairy, somewhat emarginate. Maxillary palpus with the terminal segment securiform. Labial palpus with terminal segment clavate.

Thorax wider than long, widest just in front of the middle, anterior angles strongly rounded, narrowed from the widest part of the thorax to the hind angles which are not prominent and are slightly more than a right angle. Thorax completely margined. Base with a distinct impression near the middle of the

base of each elytron. Surface dark brown or almost black, darker than the elytra. Oblique, broad depressions running from the anterior angles toward the disk; disk convex. Surface roughened by granulate punctures bearing recumbent, cinereous hairs. Scutellum finely punctured and thickly clothed with cinereous hairs.



Anelpistus americanus Horn

A. Dorsal view with 8th tergite in place.
B. Dorsal view of 9th tergite.
C. Ventral view showing 8th and 9th sternites. .
D. Dorsal view of 8th sternite with plate and spine attached.
E. Lateral view of 9th sternite and 9th tergite.
1. Aedeagus. 2. Parameres. 3. Phallobase. 4. Struts. 5. 8th tergite. 6. 8th sternite. 7. Inner fold of the reflexed edge of the 8th sternite. 8. Sclerotized plate with blunt spine. 9. Median lobe of ninth tergite. 10. Lateral lobe of 9th tergite. 11. Ventral bridge. 12. Ninth sternite.

Elytra elongate, moderately convex, brown but not uniformly so, with two wide bands of cinereous hairs, one near the middle and the other on the posterior quarter. The one at the middle wider at the edge and narrowing to the suture, not evenly clothed in the areas with the light hairs but interrupted irregularly where some punctures bear more slender, darker hairs. Punctured throughout but at the apex with punctures fine, becoming much coarser toward the base. Sides behind the humeri narrowed, making the humeri more prominent. Elytra rounded gradually to the apex. Epipleura narrow, only slightly widened at the base and not broadly widened as is true of *Scotodes*.

Front coxal cavities with a lateral fissure, trochantin visible; front coxae conical, a deep fissure between prosternum and episternum; episternum with coarse, granulate punctures bearing cinereous hairs, shiny between punctures. Mesosternal process short, not separating middle coxae posteriorly. Fifth apparent sternite of the male notched slightly at the center; sixth sternite of the male often visible. Body dark, but not as dark as in *Anelpistus canadensis*, clothed with cinereous hairs. The punctures interrupted by small, oblique, smooth areas on the lateral sides of each of the five abdominal segments. These smooth areas tend to be lighter in color. Abdomen unmargined laterally.

Tibia and tarsus subequal in length. The tibiae of the male arcuate, armed with a line of small, sharp, black teeth for more than half of the distance from the inner tibial spur toward the base. Tibial spurs in general sharp and pointed and equal in length. On a few of the female specimens, one of the spurs on the hind legs was found to be bifid, but in no case are the spurs scooped out as in the European *Scotodes annulatus*. First segment of the hind tarsus twice as long as the fourth; second about the length of the fourth; the third half the length of the second. Claws split to the base, with the inner half threadlike.

The terminal segments of the body as well as the genitalia are worth noting. The eighth tergite is rounded apically; central V-shaped area, with acute angle at the apical margin, less sclerotized than the rest of the tergite; widest about half way from the base to the apex; lateral margin reflexed. The eighth sternite posteriorly emarginate; posterior margin reflexed and so appears to make an inner fold or supporting arm with a transverse, narrow, sclerotized plate attached to the anterior lateral margin of the fold. This plate has a short blunt spine at the middle. The reflexed edge of the eighth tergite fits in between the main part of the eighth sternite and the dorsal fold or supporting arm. The ninth tergite with posterior median lobe rounded apically and with two lateral lobes considerably shorter than the median one. The anterior ventral angles of the lateral lobes are prolonged into a narrow, median, ventral bridge at the anterior end of the ninth sternite. The ninth sternite more or less slipper-shaped, rounded distally. The genital tube consists of a phallobase with a shield-shaped, ventrally placed sclerite; dorsal aspect membranous; articulation of the parameres with the phallobase well removed from the point where the aedeagus joins the phallobase. Distal ends of the parameres crossing each other; they are clothed with hairs. Two struts from near the base of the parameres articulate with the aedeagus. The aedeagus tubular, sclerotized, with length nearly as great as parameres and phallobase taken together.

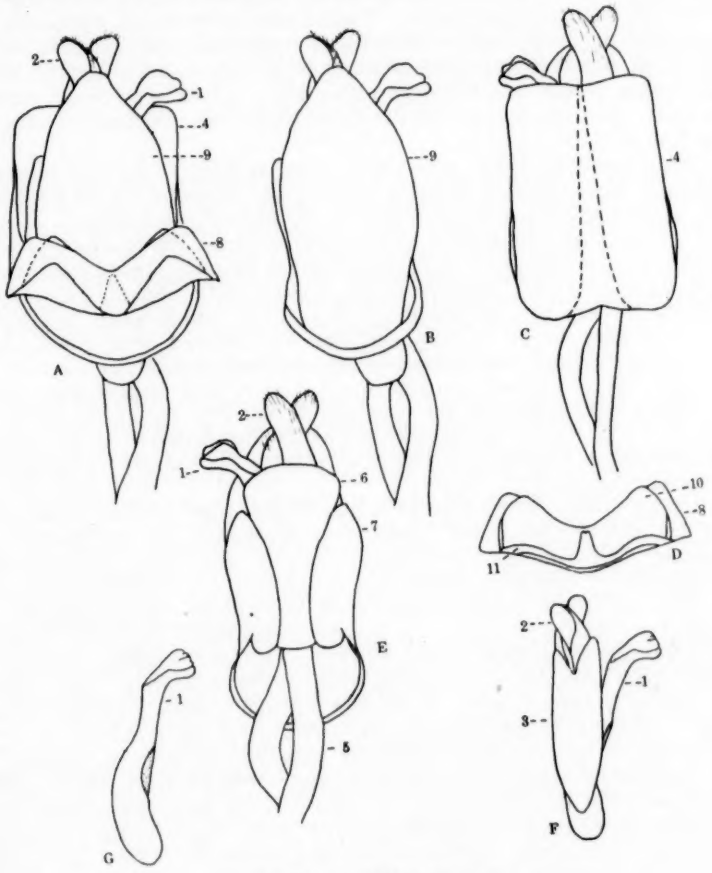
Length 8–8.5 mm.; width 2.5–3.5 mm.

Anelpistus canadensis n. sp.

Elongate, and in general facies like *Anelpistus americanus* Horn but with the background coloring somewhat darker; with cinereous hairs arranged in two bands on the elytra, one at the middle of each elytron and the other on the apical fourth. These bands are sometimes less distinct and the elytra simply appear unevenly equipped with not very thick pubescence over part of these areas, but this may be due to abrasion. Body narrower and not as convex as in *americanus*.

Head inserted in the thorax almost to the eyes, somewhat bent forward, slightly narrowed behind the eyes. Antennae filiform, with segment three elongate but less than two-thirds the length of four and five combined. Segments nine, ten, and eleven parallel sided and slightly narrower than the widened apical ends of the preceding segments. These three terminal segments are clothed with fine, silken, recumbent pubescence that distinguishes them from the more sparsely and more coarsely clothed preceding segments. Eyes situated

on the side of the head, oblique, slightly emarginate, sparsely hairy, globose. Narrowed area behind eyes and the top of the head granulate punctate. Still granulate but less coarse punctures between antennae, closer together than in



Anelpistus canadensis n. sp.

A. Ventral view showing 8th and 9th sternites.
B. Ventral view showing 9th sternite and ventral bridge.
C. Dorsal view with 8th tergite in place.
D. Dorsal view of 8th sternite with plate and spine attached.
E. Dorsal view showing 9th tergite.
F. Genital tube.
G. Aedeagus.
1. Aedeagus. 2. Parameres. 3. Phallobase. 4. 8th tergite. 5. Rectum. 6. Median lobe of 9th tergite. 7. Lateral lobe of 9th tergite. 8. 8th sternite. 9. 9th sternite. 10. Inner fold of 8th sternite. 11. Plate and spine attached to the 8th sternite.

americanus. Punctures on the clypeus not granulate, fine and comparatively sparse. Punctures bearing cinereous hairs. Labrum transverse, punctures fine and more numerous than on the clypeus. Mandibles bifid, lower tooth less prominent and slightly shorter than the upper tooth. Maxillary palpus with terminal segment securiform. Labial palpus with terminal segment clavate.

Thorax wider than long; margined, with no interruption at the middle of the lateral edge. Front angles rounded but less so than in *americanus*, and therefore with the anterior edge of the thorax wider compared with the base than in *americanus*. Lateral edge gradually narrowed to the hind angle which is slightly more than a right angle. Thorax with a depression before the middle of each elytron. Surface of the pronotum coarsely granulate punctate. Granules rather closer together and more raised than in *americanus*. Slightly depressed oblique areas located anteriorly on either side. These are not as pronounced as in *americanus* where they are deep enough so that the anterior edge of the thorax almost forms a collar.

Elytra parallel sided, about four times as long as the thorax, narrowed at the apex more abruptly than in *americanus*. Humeri not as prominent as in that species and the elytra posterior to the humeri not as sinuate as in *americanus*. Surface not uniformly colored but more or less unevenly testaceous sparsely clothed with cinereous hairs in general forming a wide band across the middle of the elytra and another on the apical fourth. Some of the specimens examined, perhaps due to handling, show these bands much less distinctly, merely appearing to be sparsely and unevenly clothed with cinereous hairs. Surface punctate, finely and sparsely at the apex, more closely at the base. Elytra moderately convex but not as much so as in *americanus;* with narrow epipleura which widen only slightly at the base and do not run up on the humeri as in the European *Scotodes*. Lengthwise furrow arising between the epipleura and the humeri not as deep as in *americanus,* making the humeri less prominent as viewed from the side.

Under surface of the pronotum closely granulate-punctate, without shiny surface between the punctures. Individual punctures not as coarse as in *americanus*. This surface more convex than in *americanus* and the edge of the thorax above narrower. Front coxae contiguous, prominent, conical, with lateral fissure on the coxal cavities, with trochantin visible. Middle coxae contiguous posteriorly as in *americanus* and in this unlike *Scotodes*. Side pieces of the mesosternum narrow. Under surface of the body rougher than the elytra due to the punctures, but not nearly as rough as the pronotum. This abdominal surface darker in color than in *americanus* and the oblique areas not as smooth or light in color. Fifth abdominal segment notched at the middle.

As in the male of *americanus*, the three specimens of *canadensis* which are all males, have arcuate tibiae on all the legs. The tibiae are less curved than in *americanus* but they all possess the same type of sharp inner edge and are armed along more than the apical half with sharp, black teeth, arranged in a line that curves in toward the inner of the two tibial spurs. These are not found on the straight legs in the male of the European *Scotodes*. The apical end of the tibia of *canadensis* is less widened than in *americanus*. In general, the form of the terminal segments of the abdomen and the male genitalia in *canadensis* follow the pattern of *americanus*, but there are some differences to be noted. The seventh tergite in *canadensis* is more broadly rounded and more convex and has a dull surface. The eighth tergite is broader compared with the length. The distal edge of the eighth sternite is more sharply slanting to the center and not as long relatively as in *americanus*. The ninth sternite is more tapering at the distal end than in *americanus*. The distal edge of the ventral sclerite of the phallobase is sharply V-shaped.

Length 7–7.6 mm.; width 2–2.5 mm.

Type. A male from Fernie, B. C.

Anelpistus canadensis can, therefore, be distinguished from *americanus* by its darker coloring; by the more roughly punctured pronotum and abdomen; by the shape of the thorax, where the front angles are not rounded as much; and by the less convex elytra which narrow more abruptly apically and are without

sinuations behind the humeri. The third segment of the antennae is less lengthened than in *americanus;* the furrows between the epipleura and humeri are not as deep as in *americanus;* the tibiae are less arcuate and are not as wide at the apex; and finally, the genitalia differ as mentioned above.

A NEW OLESICAMPE PARASITE OF PIKONEMA SAWFLIES (HYMENOPTERA, ICHNEUMONIDE) *

BY G. STUART WALLEY,

Ottawa, Ont.

During the past few years officers of the Forest Insect Unit of the Division of Entomology have reared a number of specimens of a species of *Olesicampe* from sawflies of the genus *Pikonema.* The species differs from any of the named forms of the Canadian National Collection, or in the United States National Museum, according to Mr. R. A. Cushman, to whom I sent specimens, and as far as I can discover there is no name in the literature which would apply to it. The following description is therefore offered.

Olesicampe pikonemae n. sp.†

Differs from *Holocremnus lophyri* (Riley) in having the abdomen entirely black above, and the thorax dull, with fine alutaceous sculpture, and only minute, indistinct punctures, especially on the mesoscutum. In *lophyri* the abdomen is conspicuously, frequently entirely (except for the base of the petiole) reddish, and the thorax is shining, with numerous, large, distinct punctures.

Holocremnus ratzeburgei Tschek, an European species introduced into Canada to combat the European spruce sawfly (*Gilpinia hercyniae* Htg.) resembles *pikonemae* in general color, but differs in its narrower and more strongly receding temples, mat speculum, and the short, very broad areola which is broadly confluent with the petiolarea.

Female. Length 8.5 mm. Temples rather broad, scarcely receding for some distance behind eyes, then strongly rounded behind; malar space slightly more than one-half basal width of mandible; ocellocular line a little less than diameter of an ocellus; width of face equal to distance from antennal foreman to free margin of clypeus; antenna 42-segmented. Head mat, temples shining; face and clypeus finely roughened, very indistinctly, finely punctate.

Thorax dullish; pronotum finely rugulose along sulcus, elsewhere alutaceous and without distinct punctures; mesoscutum and scutellum mat, finely and indistinctly punctate, the entire surface finely, rather evenly sculptured, notaulices very slightly impressed, but their position indicated anteriorly by slightly coarser sculpture; mesopleura somewhat shining, with fine, alutaceous sculpture and rather indistinct, scattered punctures; speculum polished; metapleura feebly roughened, and with rather numerous, shallow punctures. Propodeum dullish, finely sculptured at base, more coarsely so beyond; median and lateral longitudinal carinae well developed; basal area narrow, elongate; areola and petiolarea confluent, both regions with numerous, irregular, transverse rugulae; costulae moderately distinct, slightly irregular. Areolet rather narrow, petiole short; nervulus interstitial.

Abdomen mat, with a few scarcely discernable punctures on the basal tergites.

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*Contribution No. 2151, Division of Entomology, Science Service, Department of Agriculture, Ottawa.

†*Olesicampe* and *Holocremnus* eventually may be synonymized. Pending such action, it is preferred to describe the present species in *Olesicampe,* with which it is, moreover, in closer agreement than with the Viereck designated genotype of *Holocremnus.*

Black; scape below, mandibles except teeth, palpi, tegulae, extreme base of wings, four anterior coxae and trochanters, narrow annulus at base of hind tibia, base of first tarsal segment of middle and hind legs and tibial spurs of same, whitish; extreme posterior angle of pronotum and posterior margins of abdominal sternites, sordid white; femora reddish, the posterior pair infuscate at apex; front and middle tibia and tarsi mostly pale reddish, the middle tarsi with segments dusky at apices, apical segment entirely so; hind tibia dull reddish medially, strongly suffused with blackish adjacent the pale basal band and on apical third; hind tarsi black, except at base; wings hyaline, stigma and veins dark brownish-black.

Male. Length 7.5 mm. Antenna 37-segmented; structure and color otherwise very similar to female.

Holotype—♀, Queens County, N. S. (Forest Insect Survey, 1940), emerged in laboratory, Mar. 28, 1941; No. 5294 in the Canadian National Collection, Ottawa, Ont.

Allotype—♂, same locality as holotype, (emerged in laboratory, Mar. 30, 1941).

Paratypes—9 ♂♂, 15 ♀♀, all reared in the laboratory in the years 1935, 1937-1941, from the following localities: Charlotte, Gloucester, Kent and Northumberland counties, N. B.; Beauce and Temiscouata counties, Que.; Barriere Lake, Grand Lake Victoria, Kelly's Camp (Cascapedia River), Laniel, Langevin, Maniwaki, Notre Dame du Laus, Ste. Edwidge, St. Raymond, Que.; Port Arthur, Uffington, Ont.; Valemount, B. C. Paratypes in United States National Museum.

Hosts. The holotype and allotype were reared from *Pikonema alaskensis* (Rohw.). Some of the paratypes were reared from this species, and the remainder from *Pikonema dimmockii* (Cress.).

Remarks. In some paratypes the hind tibiae tend to be almost black, except for the narrow basal annulus; in two males the hind coxae are dull reddish, partly suffused with blackish, and one of the latter and also a female specimen have the scape whitish below, otherwise reddish-brown with a dark brown stripe above.

NOTE

DR. F. GUIGNOT'S SYNONYMY OF *AGABUS DISPOSITUS* GUIGNOT (COLEOPTERA: DYTISCIDAE)

In his paper "Contributions à la systématique des *Agabus* (Col. Dytiscidae)" (1936, Bull. Soc. ent. France, 41 (10):186-191), Guignot described *Agabus dispositus* from two females in Régimbart's collection. The types are labelled simply "Am. bor.", or Amérique boréale. This species has not been cited in American literature, and since Guignot compared it only with the palaearctic *A. clypealis* Thomson and *A. aequalis* Sharp, the following quotation from his letter of March 25, 1940, will be of interest. "Je puis vous indiquer aussi, ce qui vous intéressera, qu'après nouvelle étude je suis arrivé à la conclusion que *Agabus dispositus* Guignot=*aeruginosus* Aubé."

Hugh B. Leech,

Vernon, B. C.

A NEW RACE OF *PLEBEIUS LUPINI* BDV. FROM THE OLYMPIC MOUNTAINS OF WASHINGTON (LEPIDOPTERA, RHOPALOCERA)

BY W. N. BURDICK,
Los Angeles, California

Close to timberline in the northern part of the Olympic Mountains, particularly in the Gray Wolf Range of these mountains in the State of Washington, a small race of *Plebeius lupini* Bdv. occurs that is quite distinct in character. The Olympic Mountains, adjacent to the sea and snow-capped throughout the entire year, present quite a different environment to that which exists in the habitat of many insects. The mountain peaks and timberline meadows are almost continually enveloped by clouds of wet, drifting mist and butterflies are only in flight during occasional flashes of sunshine or upon some rare sunny day. It is reasonable to presume that many forms indigenous to the Olympic Mountains may also be present on the heights of Vancouver Island and the British Columbian coast where similar climatic and physical conditions prevail.

Superficially, the butterfly herein described is so suggestive of *Plebeius shasta* Behr, that many might consider it as a definite link between the *shasta* and the *acmon-lupini* groups. The tokens that distinguish it are constant and well established in all members of colonies in the above mentioned areas. Aside from being conspicuously smaller in size, the most notable differentiating symbols from the species *lupini* are the ground color of the underside, the brilliant green of the spangles adorning the inferior margin of the secondaries, and the tendency toward suppression of the crenated yellow band or series of submarginal crescents, both above and below, that are prevalent in *P. lupini*. In fact, many of the males reveal this latter distinction to the degree that these yellow lunules have entirely disappeared from the upper side of the wings, so that they exhibit much the appearance of *Philotes glaucon* Edw.; however these represent the minority. The conclusions presented in this composition were obtained through the study of forty specimens secured in the Olympic Mountains and scores of examples of *P. lupini* Bdv. and *P. shasta* Behr.

The name selected is derived from the Anglo-Saxon word "spange" signifying shining clasps or spangles which actually embellish this insect. It is therefor thought appropriate that it be known as

Plebeius lupini spangelatus race nov.

An analytic delineation is offered in the following synopsis.

MALE

	P. lupini Bdv.	*P. lupini spangelatus* race nov.	*P shasta* Edw.
Expanse	25 mm.	19—22 mm.	25 mm.
Ground color, upper side	Violet-blue	Same	Same
Ground color, under side	Clear, ashy-gray	Dirty brownish-gray	Dirty, brownish gray
Marginal band, upper side, primaries	Medium broad, often indistinct	Like *lupini*	Very broad, fading into ground color
Yellow crescents, upper side, secondaries	Prominent, broad, confluent	Very faint, disconnected, obsolescent, frequently absent	Almost absent. A few indistinct yellow scales
Yellow crescents, under side, secondaries	Prominent, twice the size of the metallic rings, disconnected	Very shallow, less than the size of metallic rings. Like *shasta*	Shallow, disconnected, weak in color
Metallic submarginal rings, under side, secondaries	Lustrous, silvery-blue	Brilliant, iridescent green. Like *shasta*	Brilliant green. Gold-green in old specimens
Spots, under side, primaries	Well defined, intense black	Heavier than in *lupini*. Intense black	Heavy fuscus
Spots, under side, secondaries	Small, distinct, black	Like *lupini*	Brownish
Bar on disc, upper side, primaries	Absent. Sometimes faintly shown	Absent	Present

FEMALE

Same as male in appearance except in the four following details:

	P. lupini Bdv.	*P. lupini spangelatus* race nov.	*P shasta* Edw
Ground color, upper side	Dark brown. A few blue scales near base	Like *lupini*	Blue, heavily veiled with brown.
Marginal band, primaries	Indistinct, fading into ground	Like *lupini*	Indistinguishable
Yellow crescents, upper side, secondaries	Broad, same as male	Narrow, distinct, more pronounced than in male, confluent	Narrow, indistinct, confluent
Bar on disc, upper side, primaries	Present	Present	Present

Holotype—♂, Gray Wolf Range, Olympic Mountains, Clallam Co., Washington. August, 1936; in the Canadian National Collection, Ottawa.

Allotype—♀, Same data. In the Canadian National Collection.

Paratypes—1 ♂, 1 ♀, same data; in the United States National Museum, Washington, D. C. 1 ♂, 1 ♀, Obstruction Point, Olympic Mountains, Washington, July 22, 1938; in the Canadian National Collection. Thirty-six paratypes from the same localities in the collection of the author from which specimens will be distributed to other museums.

NOTE

THE SLEEP OF *CHALYBION ZIMMERMANNI* DAHLB.*

I have already recorded how the solitary wasp, *Chalybion caeruleum* L., congregates evening after evening in the same place and spends the night gregariously in sleep.† The same behavior was observed for a sister species, *C. zimmermanni* Dahlb. in Mexico.

An hour or two before sunset on three successive days in early July, I saw about twenty *C. zimmermanni* (about one-fourth were females) congregate on a piece of rope dangling from the roof of an open-faced shed at Tamazunchale, S. L. P. The rope was near a 75 watt bulb which always burned brightly until midnight, and was also directly above an electricity-generating engine that constantly thundered away until the same hour. Apparently neither the bright light nor the noisy engine disturbed them, for they always slept soundly until morning. They did not all come together at one time in the evening, nor did they leave at one time in the morning; on one occasion the first one left the group at 8 a.m., and the last one at 10 a.m. While it was still light in the evening and after dawn broke in the morning, they were very wary and flew away at the slightest provocation, but they were always sound asleep after dark, and could easily be picked up with the forceps, or the rope could even be shaken without awakening them.

Phil Rau, Kirkwood, Missouri.

*Identified by Dr. Karl V. Krombein.

†The Sleep of Insects. Ann. Ent. Soc. Amer. 9:227-274, 1916 and 31:540-556, 1938.

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